ANALYSIS OF VARIABLE BILLING FOR NURSING SERVICES BASED ON PATIENT CLASSIFICATION

by

Monica Laura Shimp

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SUPERVISORY COMMITTEE APPROVAL

of a thesis submitted by

Monica Laura Shimp

This thesis has been read by each member of the following supervisory committee and by majority vote has been found to be satisfactory.

Chairman: Verla B. Collins, Ph.D.

J[illegible] Houg[illegible]ard, R.N., [illegible]

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[redacted]

Verla B. Collins, R.N., Ph.D.
Member, Supervisory Committee

Approved for the Major Department

[redacted]

Chairman Dean

Approved for the Graduate Council

[redacted]

James L. Clay
Dean of The Graduate School

ABSTRACT

Health care cost containment and nursing's role in fiscal accountability are important areas of research in nursing administration. The use of patient classification as a means of variable billing for Nursing Services addresses the issue of care versus cost.

The purposes of this study were to a) develop variable nursing care charges for the ICU/CCU at St. Mark's Hospital based on patient classification data from July 1, 1981 through June 30, 1982; b) compare and contrast projected revenues generated by per diem charges; c) compare and contrast projected and actual revenues with total costs and nursing costs, and d) formulate specific recommendations for the implementation of a variable charging system to evaluate the fiscal efficiency of nursing services.

The data were gathered from ICU/CCU Patient Classification Report Forms and Cost Analysis Reports to develop the Variable Nursing Charge System. The results of the study show the variable charging system to be profitable in all four fiscal quarters with a closer proportional approximation of costs to revenues.

The following implications for nursing administration are apparent. Patient classification is an efficient, effective means of manpower resource management. Variable billing based on patient classification can be developed to make nursing service an accountable revenue-generating department. Recommendations for implementation and suggestions for future research are also presented.

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CHAPTER I

INTRODUCTION

A major factor in the delivery and administration of health care is economics. The relationship between costs and revenue determines the solvency of a health care institution. During the decade of the 1970s, health care costs in the United States spiralled upward dramatically due to changes in national health care policy and socioeconomic conditions that have occurred over the past 30 years. Factors related to increased costs include: inflation, improved access to health care professionals, increased development and utilization of health care facilities, the growing chronically ill and geriatric population, improved health care technology and increased insurance coverage. In 1970, the federal government contributed 13 percent of the total cost to national health care. By 1977, 55 percent of the total cost of hospital expenditures was subsidized by Medicare-Medicaid programs (Spitzer, 1983).

Federal wage and price controls and voluntary cost

containment efforts were an attempt to change "guaranteed access" health care. Unfortunately, these short-lived actions were unsuccessful. In the 1980s, available health care dollars are being severely restricted by more stringent controls in hospital reimbursement by third party payers. Current amendments in national health care policy have required the health care industry, and specifically, hospitals, to closely scrutinize their need, responsibility and accountability to the consumer. As hospitals account for 50 percent of all health care expenditures, to control operational costs, hospitals are beginning to restrict staffing plans and wage guidelines, anticipating improved productivity and maintenance of quality care.

Acute, skilled nursing care is the primary reason patients are hospitalized. Without adequate numbers of nursing personnel, required care cannot be delivered and hospitals will lose revenue by closing beds. Nursing service as the largest labor intensive hospital department frequently appears as the most obvious area in which to contain costs and/or cut programs. Because the cost of nursing care is incorporated, and thus "hidden," in the daily room rate or per diem charge, actual costs are not known. It is, therefore, often assumed that nursing salaries are responsible for rising

costs (Walker, 1983). In order to maintain quality patient care, nursing service must validate its production of revenue for the hopsital, yet be realistic in providing care that is cost-effective. If not, alternatives to patient care delivery will be found without nursing input.

Traditionally, nursing personnel resources have been determined and allocated by intuitive or global fixed nurse-to-patient ratios (Giovanetti, 1978). Utilization of nursing resources in this manner is insensitive to variations in individual patient needs, acuity of illness, nursing time and administrative variations between hospitals. One requirement of staffing a nursing unit is the application of a specific method to determine the numbers and kinds of staff necessary to provide care (Aydelotte, 1973).

Over the past 45 years, hospital patient classification systems have been developed, implemented and evaluated for the purpose of determining nurse staffing that is responsive to the variable demands for nursing care. The concept of patient classification is to categorize or group a patient population after assessing acuity of illness, severity of symptoms, nursing dependency and/or nursing interventions required (Giovanetti, 1978). The 1980 Joint Commission on

Accreditation of Hospitals has also supported and encouraged this concept. The interpretation of Nursing Services Standard III states that "the nursing department/service shall define, implement and maintain a system for determining patient requirements for nursing care on the basis of demonstrated patient needs, appropriate nursing intervention, and priority for care" (JCAH, 1982, p. 118). Because of the large numbers of hospitals accredited by JCAH it can be assumed that some type of patient classification system is being utilized or developed to predict staffing requirements.

Patient classification systems can also be used to monitor productivity levels, justify staffing needs and assist in the budgeting process. The literature has supported the use of patient classification systems to determine nursing service personnel requirements (Pardee, 1968; Cochran & Deer, 1975; Plummer, 1976; Norby, Freund & Wagner, 1977; Meyer, 1978).

An ideal patient classification system matches patient needs with nursing resources, projects staffing needs for the nursing budget, measures efficiency of nurse managers, justifies temporary and permanent changes in staffing and can provide a basis for nursing charges (Alward, 1983). With the incorporation of a patient classification system, operational expenses of

nursing care such as salaries and wages, supplies, equipment, education and staff development can be more readily identified and justified. Changes in hospital census and acuity will be accompanied by increases or decreases in staffing plans on a more realistic and cost effective basis than with fixed nurse-to-patient ratios. To pass on this fiscal responsiveness to the consumer and provide continued impetus for nursing service, related revenues must be acknowledged and allocated to nursing units. These revenues are determined by developing a patient charging or variable billing system that reflects the nursing services the patient actually receives.

Purpose

The purpose of this study is to:

1. Develop variable nursing care charges for the Intensive Care Unit/Coronary Care Unit at St. Mark's Hospital based on patient classification.

2. Compare and contrast projected revenues generated by variable charges with actual revenues generated by per diem charges.

3. Compare and contrast projected revenues and actual revenues with total costs.

4. Formulate specific recommendations for the

implementation of a variable charging system to evaluate the fiscal efficiency of nursing services.

Problem Statement

The statement of the problem to be investigated is: How does the use of variable charging for nursing care based on patient classification effect total revenue and total cost for a critical care unit?

Conceptual Framework

The conceptual framework developed for this study identifies a relationship between the use of a nurse-initiated patient classification system and its effectiveness as a means for variable billing. This relationship functions within a systems perspective (Figure 1) which offers a unifying concept where any number of subsystems may be examined. A systems model is applied because it is not representative of a single discipline and incorporates conceptual factors of the hospital community in a flexible manner. A hospital, as a formal organization, can be viewed as both a subsystem of the health care industry and a composite of smaller subsystems, such as Nursing Service and Finance that interact toward a common goal. The informational and interactional components of an organization are bounded by the external environment and are, therefore, trans-

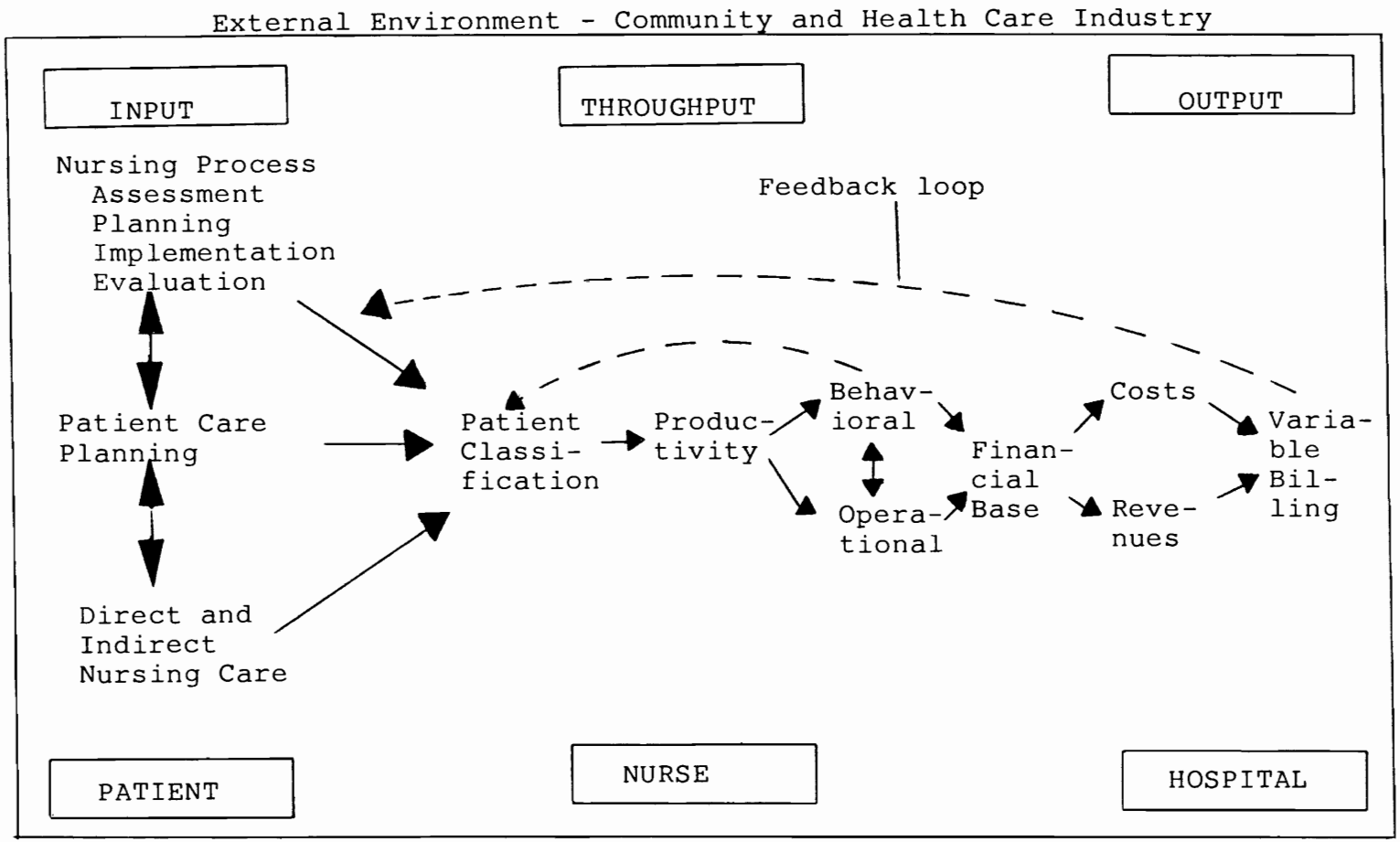


Figure 1. Conceptual framework model.

mitted in the form of inputs, throughputs, outputs and feedback. According to Conway (1978, p. 112), input is defined as "any information entering the system across its boundary from the environment." Output is "any information leaving the system across its boundary to the environment" and feedback, the "return of information as an input when the system, after a series of interactions, has deviated from its present internal state." Throughput is defined as the technology available to convert available input into desired output. As an open system, the conceptual framework presented here acknowledges that all relevant variables are not known and that absolute control of the external environment is not possible. Because sufficient organizational flexibility must be maintained to achieve desired goals, the concept of equifinality (von Bertalanffy, 1950) is accepted to demonstrate that systems at the same initial state with similar inputs and resources may obtain different outcomes.

In this conceptual framework, a patient classification system is defined as a reliable and dependable method by which a professional nurse can identify a quantifiable measure of nursing care. As an ordering concept, classification attempts to gather similar objects based on observable or inferred

properties separate dissimilar objects and maintain a proportionate degree of separation between them (Sokal, 1974; Giovanetti, 1978). As the structure in Figure 1 indicates, in order to place the patient in a particular care category, the professional nurse must obtain objective and subjective data from the patient/significant other by utilizing the nursing process. It is assumed that the professional nurse has been educated in and understands the application of the four elements of the nursing process. Assessment of the patient's physical, instructional, social and emotional needs is required to develop a comprehensive patient care plan. From the patient care plan, the degree and frequency of direct and indirect nursing care to be implemented, maintained and/or adjusted are identified in hours, documented and then evaluated on a shift-to-shift basis. The incorporation of direct nursing care tasks alone in a patient classification system presents a narrow view of nursing practice and implies a specific beginning and end to the nursing process. A continuous interactive relationship exists between the nursing process, patient care planning, and direct/indirect patient care. Direct nursing care is defined as nursing intervention with the patient. Indirect nursing care is defined as preparation and followup requiring no patient contact

including administration, coordination and education. Thus, a relationship exists between the nursing process and a patient classification system.

Patient days per month has been a traditional measure of productivity in several hospital departments, including nursing service. A department of nursing has no control over this measure of productivity. Nursing does not admit patients to the hospital, nor does it decide how long the patient will remain in the hospital. In this conceptual framework, productivity establishes a relationship between the amount of acceptable output produced and the input required to achieve that output (Jehnek & Dennis, 1976). Productivity is defined as a measure of how well resources are managed and levels of service obtained. There are both operational and behavioral components to this concept. Operationally, by identifying nursing care hours and assigning nursing personnel in a manner consistent with those hours, there will be control over the delivery of the best possible nursing care in the most appropriate manner at the lowest cost. Behaviorally, the involvement of the professional nurse in the designation of patient care requirements allows independent decision making, flexibility, self-direction and job enlargement, by enhancing judgment skills. These subconcepts promote

employee productivity and motivate the professional nurse to reevaluate the patient's needs and incorporate changes in the plan of care.

As the hours of nursing care required increase, more nursing personnel are necessary to deliver care and the cost of providing that care is higher. By assigning a daily nurse charge based on the patient classification system's hours of direct and indirect nursing care, revenue may be projected for the department of nursing. In this way, nursing is removed from the per diem charge and is separated from ancillary support systems such as housekeeping, maintenance and dietary. A relationship is established between costs, the level of resources consumed, revenue, and the return on the level of services delivered. By distinguishing variable and fixed costs in a department of nursing, and monitoring changes in volume through patient classification and variable billing, total costs and total revenues will be equated more closely than when actual patient days and anticipated revenues are lower than predicted and expenses remain high because of patient acuity. Budgetary data will, thus, be more closely approximated for cost control because it specifically takes into account how costs can change with variations in output volumes. As the department of nursing realizes revenue

generation, a feedback loop will continue to challenge the employee and organization and evoke a sense of involvement in the total operation and commitment to quality care for the patient.

CHAPTER II

REVIEW OF LITERATURE

Patient classification has received a large amount of attention by many investigators in the area of methodological research. Abdellah and Levine (1979) offer three possible explanations. First, patient classification systems have particular, although not exclusive, application in inpatient areas that are more obvious than in other fields. This relates specifically to planning the assignment of nursing personnel as acute patient care in hospitals represents the largest consumer of nursing skills. Second, the economic value of patient classification can be assessed by matching nurse staffing expense to patient requirements. Adherence to assignment by patient classification should prevent overstaffing. Third, in reviewing nursing administration methodologies, patient classification offers an approach unique to nursing. Other techniques used in analyzing patient care needs such as work sampling, audits, performance evaluations and cost accounting owe their development to other disciplines.

This review of the literature will be limited to patient classification systems developed for acute inpatient facilities and will not address those designed for long-term care or psychiatry.

Two general ways of designing patient classification instruments have been identified (Abdellah & Levine, 1979; Giovanetti, 1978). "Prototype evaluations" are distinguished by broad definitions and characteristics of typical patients graded by an ordinal scale into categories requiring more or less nursing care. The categories are mutually exclusive and exhaustive. The patient is classified into the category of care that most closely matches his characteristics with those in the prototype description.

The "factor evaluation" instrument delineates specific elements or indicators of care that are independently rated. The identified indicators are then combined to determine the patient's classification based also on an ordinal scale that limits the number of elements in each category. This design also intends to identify mutually exclusive and exhaustive categories. Both evaluations produce an end-product that is essentially the same but differs in the method of rating.

The two classification designs are often referred

to as "subjective" and "objective" patient classification instruments. Giovanetti (1978) reports that concern was expressed during the development of prototype evaluations about the large degree of subjectivity that was inherent in broad descriptions and could not be controlled between different nurse raters. The factor evaluations were thought to result in total objectivity as specific condition states or patient requirements had to be present. It is currently recognized that some degree of subjectivity is, and should be, present in both designs.

Patient classification frameworks can be found to be described informally by Florence Nightingale where the most seriously ill patients were placed closest to the ward sister's office to facilitate observation. Patients with fewer dependency needs were placed at the far end of the ward (Giovanetti, 1978). This system was also very subjective as different nurses would have to determine what constitutes high and low dependency.

An early attempt to quantify and operationalize patient care needs involved a study of 50 selected hospitals in New York by the National League of Nursing Education in 1937. One result of the study was the recommendation to incorporate 3.4 to 3.5 total nursing hours per patient day. This recommendation marked the

beginning of the use of global averages in the delivery of nursing care. Patient classification was not specifically referred to or identified in this study, but a statement in the discussion that followed the recommendation had a major effect on the development of future systems: "The next step is to determine what the right number of hours of nursing for the various categories of ward patients should be."

The first formal effort to classify patients by assessing nursing care requirements was in response to rising health costs and personnel shortages following World War II. In 1947, A Study of Pediatric Nursing was published by the National League of Nursing Education. This factor evaluation classification system was developed for pediatric patients and rated the patient on four factors: the degree of illness, extent of activity, number and complexity of treatments and procedures, and nature of adjustment. A three-point scale of intensity was used to rate each factor and from this a patient profile was drawn. This study attempted to establish a relationship between the classification and the amount of nursing time but was not refined enough to determine staffing.

Marion Wright (1954) in a study done at Harper Hospital in Detroit, Michigan investigated the extent of

illness during a 24-hour period. A three level prototype evaluation system was used to classify patients according to acuity. The scale identified the patient as acutely ill, moderately ill, or mildly ill, based on the number of medications, treatments, and diagnostic procedures provided to each patient. Work sampling measurement of nursing personnel activities and an assessment of patient satisfaction were also done. The findings from several wards were compared and revealed large percentage differences in the amount of time spent in each of the three acuity levels. No ideal staffing plan could be concluded but time consumed by each category of nursing personnel was identified and a recommendation that more nonprofessional staff should be utilized was made.

In 1950, the University of Pittsburgh School of Nursing initiated a study to determine care hours and a master staffing pattern. A prototype evaluation patient classification tool was designed using four categories. The same nomenclature found in Wright's study was used with the addition of a "critically ill" category. Hours of care were found to vary widely within the acuity categories and were not used as a part of the experimental staffing pattern. What was significant within the acuity levels was the different type of care found

to be needed by the "mildly ill" because of the large amount of health teaching that was done. A large amount of emotional support was noted in the "moderately ill" category. The study concluded that physical dependency was one of several factors that must be considered in the total care of a patient (George & Kuehn, 1955).

A patient classification system developed by the United States Army in the 1950s was discussed by Claussen (1955). A nine category scale was developed at Walter Reed Hospital that was later reduced to eight. Followup studies by two other army hospitals reduced this number to four based on four critical factors influencing nursing care requirements: nursing procedural requirements, physical restriction, instructional needs, and emotional needs. The four patient categories identified were: intensive care, moderate care, minimal care and supportive care. This prototype instrument was eventually accepted as the Army method of patient classification. There are, however, limitations to this system. Because the patient population is primarily young males, it is not representative of patients in all hospitals. The guidelines established for each category were not well-defined and resulted in a large degree of subjectivity by the head nurse classifying the patients. Adjectives such as "frequent," "same," "more," and

"moderate" were used without operational definitions. Lastly, there is a stronger orientation toward the physical needs of the patients and minor regard for psychological needs, observation and teaching.

A joint venture by the Division of Nursing Resources, U.S. Public Health Service and the Office of Defense Mobilization in 1957 expanded the Army prototype evaluation instrument to a factor evaluation tool. This classification system is based on six factors that rated each factor on a four-point scale of need intensity. The point values allowed each patient to be rated independently on each factor thus reducing the "halo effect" that occurs in a prototype system when several factors are rated simultaneously and nonindependently. Patients could receive a minimum of six and maximum of 24 points from which ranges were identified and the four categories established. This study represented one of the first attempts to apply quantitative scaling techniques to patient classification methodology.

A system that addressed medical and nursing care requirements represented a broader approach to patient classification and was termed "progressive patient care." Noback (1958) at the University of Kentucky conducted the first investigation into this enlarged area of classification and was followed by a similar

investigation sponsored by the U.S. Public Health Service at Manchester Memorial Hospital in Manchester, Connecticut (Haldeman & Abdellah, 1959). The purpose of this system was to arrange facilities and services to meet the needs of the patients. One hundred items of information were collected on each patient in the Kentucky study and the patients were grouped into four categories: "critical," "intensive," "standard," and "minimal." Because a large number of factors were evaluated in these systems, 16 criteria in the Connecticut study, the methodology was aimed at making a determination of the most efficient kind of nursing unit the patient could be assigned to. Because this system was not designed for nurse staffing and only provided gross estimates, severity of illness was focused on which did not always provide appropriate correlation with nursing involvement.

The patient classification system developed at Johns Hopkins (Flagle, 1960; Conner, 1960) received the largest amount of reliability and validity testing. Levine (1960) found the instrument to have a reliability coefficient of 0.92. This system had three categories: intensive, intermediate and self-care. The format closely followed the one developed at Manchester Memorial Hospital and gave a specific estimate of

nursing time requirements by patients. Virtues of the system are that it is both simple and objective and identifies readily observable physical characteristics in a short period of time. The system only provides a 24-hour forecast because of patient's quickly changing needs and neglects instructional and emotional needs. It does not specify staffing mix. Additional studies were done by Conner (1961) to try to develop an index to measure direct workload and variation in workload. A multiple assignment method was designed where personnel from the low-workload floors would be assigned to high-workload floors and thereby provide optimal staffing. Significant findings of the Johns Hopkins study include:

1. Patient care needs are not a function of census alone.

2. There is a large variation in nursing staff demands in relation to the average demand.

3. Variations in demand differ from floor to floor.

4. The main determinant of nursing workload was the number of intensive care patients (Giovanetti, 1978).

Pardee (1968) developed a three category patient classification system at the University of Washington Hospital, Seattle, to predict staffing requirements. A

patient's kardex was used as the classification determination tool with the ward clerk as patient categorizer. Criteria for categorizing patients were identified following activity studies on six units. In this way, hours of direct nursing care required for patients in each category were also determined for each unit. Staffing figures adapted from a study done at Akron Children's Hospital in Ohio (DeMarco & Snavey, 1963) were used to obtain total hours of required patient care for all shifts. Total hours of care required were compared to total hours of available care and staffing modifications were made when possible by "floating" nurses to units in need. The author reported that by utilizing this method, weekend calls for help were reduced, nurse attitudes toward floating improved, and kardexes were kept more current.

Patient classification systems developed in the late 1960s and 1970s all have been adapted or built upon the studies mentioned, most notably the Johns Hopkins study. The systems to be discussed next represent those that American hospitals are now utilizing or adapting the most frequently. Since medical/surgical nursing units represent the most common area of patient care provision, developmental efforts in patient classification have been in this area.

The CASH (Commission for Administrative Services in Hospitals) system was developed in 1963 following concerns of the Hospital Council and Blue Cross of Southern California in improving hospital cost-effectiveness. A time study was undertaken to establish standards for nursing care procedures and from these procedure frequencies, standard care hours per shift were determined. Originally, a four category prototype evaluation form was designed and the average hours of care per patient day were assigned to the four care levels. Following numerous changes, the present factor evaluation patient assessment form is very long and detailed and requires the nurse to circle numbers assigned to procedures in 12 areas of care. The variable scores are then translated into point values to correspond with the four ranges of care. A constant coefficient is added to quantify the constant activities nursing routinely performs for each patient. To determine staffing, the variables plus the constant points are totaled and then multiplied by 0.1 hour, the equivalent of each point. A staff member who works eight hours is expected to care for patients totalling 80 points (CASH, 1977). This system represents an extreme of factor evaluation, and utilization and acceptance are difficult because of the amount of details

involved.

Based on the Johns Hopkins work, Poland, English, Thornton and Owens (1970) developed PETO (an acronym for the surnames of the project team). This system was developed to assess patient care requirements at the Eugene Talmadge Memorial Hospital in Atlanta, Georgia. Observation and time studies were again initiated to assign points to various criteria under seven categories of care. To determine a patient's care itensity, appropriate points were totalled to find the PCU (patient care unit in hours). PCUs were then compared with the actual amount of staff time available labeled NCU and patients were admitted to units based on the amount of NCUs and not just available beds. Nursing care audits conducted before and after the system initiation documented a 19 percent improvement of completed patient care procedures. This system does not represent a complete measurement of patient care requirements, but does provide a daily trend index in evaluating nurse staff availability.

The Medicus Corporation (Norby, Freund & Wagner, 1977) together with the Rush Presbyterian-St. Luke's Medical Center in Chicago, Illinois produced a four category factor evaluation system after an extensive literature review and analysis. Once again, utilizing the theory

developed by Conner at Johns Hopkins a 32-indicator form defining significant nursing workload activities was designed differentiating care categories. Each indicator has an associated time value and includes physical, emotional and teaching needs. The weighted point values were derived following time and motion sampling, consultation and Department of Nursing acceptance. It is important to indicate that this patient classification system was developed by establishing nursing hours per patient boundaries first and then identifying the appropriate care indicators. Operationally, this system is simple. The responsible nurse checks off the appropriate patient condition indicators which are summed by the ward clerk who then identifies into which range category the points fall. A workload index is calculated in the Nursing Office from the number of patients in each category and together with unit census and the number of scheduled staff, nurse assignment decisions are made. Pierce (1974) developed a nurse staffing methodology utilizing this system that determined two skill mixes for nursing personnel per shift from which long-range staffing and budgeting predictions could be made.

The Saskatchewan Hospital System Study Group during a five year study developed a patient classification

system and workload index using a combination of critical indicators of direct care that included four categories. A set of definitions for the indicators and descriptive category guidelines assist the nurse in assigning the patient to the appropriate category. Validations on assignment were done by continuous observation in different care settings (Giovanetti & McKague, 1973). This classification procedure can also be completed in a timely manner and includes categorization for obstetrical patients. Meyer (1970) described the refinement and testing of a system of nursing workload measurement and management entitled GRASP. Applications of the GRASP system were designed to affect budgeting, staffing, admitting, auditing, charging and billing. GRASP, an acronym for Grace-Reynolds Application of Study of PETO uses Patient Care Units (PCUs) for all incoming admissions and nursing care units (NCUs) available to evenly distribute the workload among the nursing units. Significant physical care activities derived from the PETO study were refined and validated and time studies specific to Grace Hospital in Morganton, North Carolina were done to establish time standards. A point range with PCU conversion is used which then addresses available staffing. The author reported a cost savings of $20,000 in fiscal year 1977 because of the ability to minimize overstaffing during a

low PCU workload period. Staff satisfaction is described as being derived from the opportunity to provide quality care when workload situations are balanced. The admitting department is also trained in the use of PCUs and NCUs which improved interdepartmental relationships through the use of a common language. The author stressed the importance of identifying time standards for the specific institution utilizing this system.

A factor evaluation form structured after the Pardee (1968) system was studied at the Virginia Mason Hospital in Seattle, Washington. Hanson (1976) reported that 12 critical indicators drawn and compiled from a list of 72 activities assigned patients into four categories. High correlations were found with total direct care time and the 12 indicators finally selected. Time standards for each classification level and indirect care were established following activity studies and instrument testing. System validation included studies at two other area hospitals involving self-recording by the nursing staff. The San Joaquin General Hospital (1976) system also adapted the Virginia Mason instrument and quantified workload based on the Saskatchewan studies.

These critical indicator factor evaluation instruments represent systems that require minimal

nursing time to complete. They can be easily adapted to other acute care facilities following analysis to determine average care times or standard times, and the evaluation of institutional design, type of nursing organization, treatment modalities, physician practices and availability of nurse staffing mix. The term critical is not meant to be used in the medical sense but identifies nursing care activities that have the greatest impact on nursing care time and utilization (Giovanetti, 1978).

In the area of critical care nursing, patient classification poses a rather unique problem because of the complexity of nursing care, specialized equipment, and monitoring that requires additional skills and judgment, as well as the frequent changes in patient status. Many hospitals have adapted the above mentioned systems to critical care units by increasing care hours, establishing new categories, adding activities or redefining critical indicators. Two systems, The Therapeutic Intervention Scoring System developed at Massachusetts General Hospital in Boston, Massachusetts, and the Montefiore System, developed at the Montefiore Hospital and Medical Center in the Bronx, New York, will be described as examples of critical care patient classification systems.

The Therapeutic Intervention Scoring System (TISS) (Cullen, Civetta, Briggs & Ferrara, 1974) was developed to provide quantitative data that would differentiate nursing input in intensive care units from other patient care areas in the hospital. This method attempted to classify the severity of illness of patients by quantifying therapeutic interventions provided by intensive care nurses. A list of 54 procedures and therapeutic interventions was made and a committee of physicians and nurses assigned point values; one to four to the various interventions according to the time and effort required for nursing care. Nurse staffing per unit and per shift was calculated by devising a staffing index and multiplying the index by the average points per patients. The authors believed that TISS provided insight into the areas of psychologic stress, judgment and necessity for crisis intervention and could decrease high turnover rates in these areas (Cullen et al.,1974). TISS also assumes that physicians will react similarly if they have the appropriate equipment to provide care. Patient psychosocial needs and teaching requirements are not considered which represent a large uncontrolled nursing care variable that may vary from unit to unit.

The Montefiore System (Jackson & Resnick, 1982) is a prototype evaluation system that uses four categories

of care that are evaluated in seven areas of care including physical restriction, dependency, nursing assessment and interventions, medication, psychosocial-emotional, and planning and evaluation. Unit acuity is determined on a shift-to-shift basis with staffing calculations made by the Nursing office based on hours of care required. The author reported that the tool is complete but allows some subjective judgment. An inter-rater reliability study showed 75 percent to 100 percent agreement among users.

A study conducted by Jackson and Resnick (1982) compared these two systems. Of 132 patient shifts compared, discrepancies were reported in 90 shifts or 68.2 percent. Subjectivity in the Montefiore tool was cited as a possible reason for the differences, however, the authors doubted that any system which had not been tailored for a particular institution's circumstances could be used and seriously questioned whether patient classification standards could be set on a nationwide basis.

Because TISS is used to quantitate illness and does not address the nursing time necessary to provide these interventions, a sicker patient will require more nursing care, but quantification is applied to the patient and not the care required. Hudson, Caruthers

and Lantiegne (1979) completed a prospective study using the TISS system to quantitate the amount of time necessary for sufficient care and matched those times with the severity of illness, with specific reference to varying requirements for different patients. Results showed that objectively identifying hours of care required per patient, avoided the pitfalls accepted when a nurse-to-patient ratio is arbitrarily established and the nurse fails to complete necessary cares because the cares required exceed her total possible work output.

Very little literature was found in the area of using patient classification as a means of charging patients for nursing care received. Several articles suggested that patient billing for nursing care based on patient classification would be a natural outgrowth and may make significant contributions in the areas of cost containment.

Knowlton and Dunn (1971) developed a system that classified patients into three levels of care and five levels of dependency. Staff allocation was based on the hours of actual nursing time. Following daily review of level of care, a patient received points in each of the five dependency categories which modified the charge for nursing care. This structure was accepted by the Social Security System and Blue Cross of Arkansas. The author

reported a substantial cost savings but no figures were given.

In the article, "Charging by Level of Nursing Care," Holbrook (1972) described a patient charging system that separated room charges from nursing and food charges. Room charges were based on specific related costs and prorated expenses from nonrevenue producing departments. A consultant was used to determine nursing charges derived from a four category prototype patient evaluation system. Intensive care patients were handled separately. A "time sheet" was prepared each shift from which patients were billed for nursing services. Holbrook argued that potential revenue producing departments should be self-supporting and that costs and charges should be absolutely related. Also, patients should pay for the care and services they actually receive and not be required to subsidize patients requiring more products and services. Program benefits included management control of nursing personnel staffing to prevent over- or understaffing, better utilization of facilities and actual cost versus charge relationship figures that were useful in negotiating with third party payers.

St Luke's Hospital Medical Center in Phoenix, Arizona began developing a cost-based financial system

in 1971. As a hospital-wide system it was designed to functionally operate within the hospital's fiscal philosophy requiring that:

1. The price of each individual service should be based upon the cost of providing that service.

2. Pricing departmentally or on a program basis should be adequate to sustain financial accountability.

3. Sufficient funds be generated to provide for current operating needs related to patient care, preservation and replacement of equipment, improvement and expansion of equipment and facilities, and amortization of indebtedness and working capital needs (Cisarik, Higgerson & VanSlyck, 1978).

Nursing administration believed that a cost-based system would generate variable charges for nursing service. This is based on the belief that the cost of nursing care varied with each level of illness because patients' needs for nursing care varied with the level of illness. In addition, different types and numbers of nursing personnel were required to provide care for each level.

A factor evaluation point system was used to determine the patient's classification level and total points determined a charge related to that acuity level. The point values were based on the amount of time and skill level nursing tasks required. Points were also

allotted for time spent providing family support and/or patient education. Five acuity levels existed for general medical surgical units, two for critical care. A staffing matrix defined the number of staff required for x number of patients of y acuity level (LaViolette, 1979).

To establish charges at St. Luke's, Relative Value Units (RVUs) were determined to equate procedures and processes that did not require equal amounts of supplies, equipment, and personnel and were combined with daily patient acuity level distributions, current costs and patient-day projections. Nursing care charges were summarized on the patient's bill by acuity level, thus identifying nursing care as a separate and identifiable charge. The St. Luke's group identified the following assumptions that must be accepted in order for variable billing to be successful:

1. Revenue and expenses are defined and assigned to appropriate cost centers.

2. The cost of providing each individual service is identified.

3. Patients' bills are based on that cost plus a contribution toward profit.

4. Each patient pays only for services received and does not subsidize services received by other

patients.

5. Nursing care is an identifiable entity that can be defined, measured and costed.

6. Nursing care varies with patient diagnosis, age, level of illness and so forth.

7. A direct relationship exists between nursing care provided and costs (Higgerson & Van Slyck, 1982).

This last assumption is supported by Walker (1983) in his study to determine the share of total hospital charges attributable to nursing. His preliminary findings suggest "that actual nursing care is not as costly as many hospital administrators and physicians would lead us to believe" (Walker, 1983, p. 16).

The adult intensive care units at Stanford University Hospital were used to collect data on five patients with similar lengths of stay in six disease categories. A factor evaluation system of critical indicators identified five levels of direct nursing care. Level V required the most amount of care. Patient acuity was assessed three times daily, four hours before the next shift. Patients were assessed by the nurse on a form that was read by an optical scanner and the information was directed into a computer to a centralized staffing office. A 24-hour average of the levels of care were included in the per diem room

charge, not as a separate nursing care charge. For the 30 patients studied, direct nursing costs were separated from the total nursing care and nonnursing services. Direct nursing care represented 55.4% of these costs. When compared to total hospitalization charges across the six diagnoses, nursing costs approximated 12 to 20 percent.

At the Massachusetts Eye and Ear Infirmary a productivity-based accounting system has been used since 1976. Wood (1982) reported that more than $1.3 million has been saved annually out of a budget of approximately $31.7 million. In this system, costs are divided into four elements that more closely approximate charges with services rendered: hospitalization cost, cost per patient day, cost of clinical care, and ancillary services. Nursing charges are found under "cost of clinical care." Patients are billed for units of care received using an adaptation of the PETO patient classification system. An important aspect of this system is that for financial accounting purposes, clinical units per day are predetermined by diagnosis based on extensive case studies and have been agreed upon by third party payers. This, according to Wood, allows nurses to concentrate on providing optimal care instead of being concerned with the recording of every service

performed for every patient.

The issues of validity and reliability of patient classification systems are important factors when discussing the expanded use of patient classification methodology. Giovanetti (1979) and Chagnon, Audette, Lebrun and Tilquin (1978) indicate that hospital and nursing administration often express difficulty in identifying that patient classification systems actually measure what they claim to measure. Concurrent and content validity are difficult to establish because nursing lacks a widely accepted and validated patient classification system. The predictive validity demonstrated by some research (Giovanetti, Mainguy, Smith & Truitt, 1970) relates to providing care based on patients perceived needs or predetermined standards of care and not actual needs. Giovanetti (1979, p. 7) states that "it is unlikely that this validation can ever be shown satisfactorily." Because of the complexity of designing a patient classification system, the validity problem is further complicated by hospitals who adopt and implement a system without modification to their particular medical and nursing frameworks. A limited local survey done by Alward (1983) of eight large metropolitan hospitals in New York City revealed that one hospital had no patient classification system for staffing purposes,

five had borrowed systems without modifications in quantification coefficients or standard hours for each category, and two quantified their systems following the purchase of work analysis studies. Alward (1983) also reported that no specific validating guidelines or methodologies were available in the literature.

Interrater reliability is much easier to measure and can be maintained if orientation and continuing education programs are consistent. Huckabay and Skoneiczny (1981) specified a 90 to 95 percent interrater reliability level through practice in classifying patients during orientation sessions. Periodic concurrent audits were also reported to monitor interrater reliability (Giovanetti, 1979). Alward (1983) also suggested that instrument review and/or revisions should also be made on at least a yearly basis to reflect changes in the nursing environment and patient population.

In summary, the development of patient classification systems has had significant impact on nursing practice. It has provided a means of identifying the appropriate proportion of professional to nonprofessional nursing staff, identified appropriate facility placement of patients, quantified nursing care requirements separate from census, differentiated

nursing from nonnursing tasks, and stimulated a conscious effort to contain cost through the efficient use of resources. The significant feature of this study is to demonstrate the expanded use of patient classification as a means for variable billing that will fiscally benefit patients, hospitals, the nursing profession and the health care industry.

Definition of Terms

For the purpose of this study, the following definitions will be employed.

Patient Classification System

A patient classification system is defined as a method used by nursing personnel to categorize a patient population after assessing and documenting nursing dependency and nursing interventions required.

Direct Nursing Care

Direct nursing care is defined as interventions with patients including physical, psychosocial and teaching.

Indirect Nursing Care

Preparation and followup requiring no patient contact including administration, coordination with

physicians and ancillary departments, and nursing staff education are defined as indirect nursing care.

Critical Indicators

Critical indicators are nursing interventions recorded on a factor evaluation patient classification form.

Variable Billing

Variable billing is considered a patient charging system based on hours of nursing care derived from a patient classification system.

ICU/CCU

An ICU/CCU is an intensive care unit/coronary care unit where critically ill patients are admitted for specialized nursing care, monitoring, and life support systems.

Actual Total Revenue

Actual total revenue is defined as the amount of monies generated by multiplying a per diem room charge by patient days over a specified period of time.

Projected Total Revenue

Projected total revenue is the anticipated monies generated by a variable billing system.

Total Costs

Total costs are defined as the fixed and variable expenses incurred over a specified period of time.

Fixed Costs

Costs which remain substantially the same in total amount within a given range of output activity are defined as fixed costs.

Variable Costs

Variable costs are those costs which vary in relation to changes in the level of activity.

Computatio n Chart

A computation chart is a form used to compile and analyze patient classification data on a daily basis.

CHAPTER III

METHODOLOGY

This investigation was an exploratory, descriptive study based on patient classification information collected at St. Mark's Hospital from July 1, 1981 through June 30, 1982 yielding ordinal data. These data were used in conjunction with financial information available from the Accounting Department at St. Mark's Hospital to develop a variable nursing care charging system from which projected revenue data were derived. Projected revenue and actual revenue were compared to actual costs and nursing costs in order to evaluate the fiscal efficiency of nursing services.

The Setting

St. Mark's Hospital in Salt Lake City, Utah served as the research setting. St. Mark's Hospital is a 306-bed private, nonprofit community institution, centrally located in the Salt Lake Valley. The hospital is accredited by the appropriate state and national agencies and provides medical, surgical, obstetric,

neonatal, pediatric, emergency and critical care services. Patients cared for in the 18-bed ICU/CCU are specified as the study population.

The ICU/CCU at St. Mark's Hospital is a combined service, multidisciplinary clinical nursing unit that accepts patients that require specialized nursing care and interventions, monitoring and life support devices. Both medical and surgical patients are admitted to the ICU/CCU by attending physicians on the hospital staff. Common diagnoses of patients admitted to the ICU/CCU can be found in Appendix A.

St. Mark's ICU/CCU Patient Classification System

Prior to November 1980, St. Mark's Hospital had no patient classification system to determine nursing care hours per patient. Staffing was determined by an intuitive nurse-to-patient ratio that varied somewhat between clinical units and was mutually agreed upon by the Director of Nursing and the Nursing Coordinator. These staffing levels had been maintained for many years, even though patient census, patient mix, acuity levels and hospital services had increased.

The ICU/CCU patient classification instrument, hours of patient care per day and staffing mix currently in use were developed by the investigator following

attendance at workshops on patient classification sponsored by the National League for Nursing and West Coast Management Associates, Inc. The purpose of the ICU/CCU patient classification system is to identify patient acuity and number of nursing hours of care required based on patient dependency and nursing intervention needs.

This patient classification instrument utilizes "critical indicators" of patient care to place patients in patient care categories labelled Class V, VI, VII and VIII. The critical indicators serve to reveal a larger grouping of patient care requirements that have the greatest impact on the care of one patient in relation to another patient. Identification of the appropriate critical indicators to check are identified from information on the patient chart, medication kardex, patient care plan and treatment kardex. Instructions and descriptions of the critical indicators may be reviewed in Appendix B. The patient classification worksheet (Appendix C) is completed in the ICU/CCU on every shift to identify the number of patients in each category and to establish nurse staffing requirements for the next shift. Patient classification data are reported to the nursing office where the calculations are made and documented. Under- or overstaffing

situations are remedied by placing nurses on an "on-call" status, sending "float pool" personnel or calling off-duty ICU/CCU nurses to work an additional shift. Patient classification categories and number of hours of care are directly related to variable costs and nursing hours.

Descriptions of the four patient care categories in the ICU/CCU are described as follows:

Class V. Class V patients require 12 hours of nursing care in 24 hours. Patients requiring ICU/CCU will have a minimum classification of V which infers monitoring and general ICU/CCU patient care load. The nurse may comfortably care for two patients. These patients may have one or two invasive lines, ventilators, controlled cardiac arrhythmias, stable vital signs, neurologic checks monitored, or treatments administered every two hours, have two or three intravenous lines and require emotional or teaching support.

Class VI. Class VI patients require 18 hours of nursing care in 24 hours. The nurse may care for one Class VI and one Class V patient. These patients may have one or two invasive lines, ventilators, controlled cardiac arrhythmias, vital signs, neurologic check and/or treatments monitored or administered every hour,

require vasoactive drugs, lidocaine infusions, four or more intravenous devices and/or intravenous medications and require emotional and/or teaching support.

Class VII. Class VII patients require 24 hours of nursing care in 24 hours. A nurse may not adequately care for a Class VI or Class V patient in addition to a class VII patient unless that patient's condition improves during the shift. These patients may have vasoactive drug and lidocaine infusions and require frequent monitoring of vital signs, neurologic checks and/or treatments every 15 to 30 minutes, have three or more invasive lines, ventilators with frequent arterial and/or venous blood gas determinations, require isolation technique, have cardiac arrhythmias that are not controlled and require the intraaortic balloon pump. Simple recovery patients such as thoractomies, peripheral vascular surgeries and general surgery patients may require 1:1 nursing care for at least one hour during the initial recovery period. Major cardiac surgery patients require 2:1 nursing care for at least one to one and one-half hours and then assume a 1:1 ratio for one to two shifts depending on the patient's condition.

Class VIII. Class VIII patients require 48 hours of nursing care in 24 hours. This classification is

reserved for unstable patients on the intraaortic balloon pump in the manual mode, major unstable trauma patients or those patients where unstable conditions anticipate cardiopulmonary resuscitation.

Validity and Reliability of the ICU/CCU Patient Classification Instrument

Content validity of the instrument was judged appropriate by senior members of the ICU/CCU nursing staff and first-line managers during the developmental and pilot study stages. Criterion-related and construct validity of this instrument have not been tested.

Interrater reliability has been informally measured as being high during orientation of new personnel to the patient classification system. This follows practice and understanding where necessary information to mark indicators can be found in classifying patients. A patient classification quality assurance audit done in January 1982 by non-ICU/CCU personnel reviewed classifications of 71 patients and found 66 patients (93%) appropriately classified.

An unpublished internal Quality Assurance Report completed at Holy Cross Hospital in Salt Lake City, Utah in January 1983 surved 41 patients. They compared the ICU/CCU patient classification systems utilized at Holy Cross Hospital, St. Mark's Hospital and Montefiore

Hospital (Bronx, New York). Analysis of the findings found St. Mark's Hospital's number of hours of care equal to those at Holy Cross Hospital at a rate of 49%. St. Mark's Hospital was greater than Holy Cross Hospital at the rate of 34%; and St. Mark's Hospital was reported at 17% less than Holy Cross Hospital.

Data Collection

Patient classification information generated by nurses in the ICU/CCU served as a convenience sample. Data were retrieved from a variety of sources including 1) the Patient Classification Report Form compiled by the Staffing Coordinator in the Nursing Office from July 1, 1981 through June 30, 1982. 2) The 24-hour form records by shift, 3) the number of patients in the ICU/CCU, 4) the total number of care hours and 5) the number of nurses necessary and scheduled. Data from the evening shift were also collected for this study. In addition, quarterly Cost Analysis Reports compiled by the Accounting Department during the same time period were used to identify actual revenue, direct and indirect expenses.

To develop the variable charging system for nursing service, fixed and variable annual nursing costs and other total ICU/CCU costs were collected. Fixed nursing costs from the Cost Analysis Reports included both

direct and indirect expenses; vacation and sick time contributions, workshop costs, nursing administration and nursing education department costs. Direct variable costs included salaries, overtime pay, differential pay, and other employee benefit costs such as retirement, medical and dental contributions, life insurance and F.I.C.A.. All other fixed and variable expenses were identified as other total ICU/CCU costs.

A nursing charge per hour was determined from the annual nursing costs and an ICU/CCU daily room charge was calculated from the other total ICU/CCU costs using the following equations:

$$\text{Nursing Charge per hour} = \frac{\text{Annual Nursing Costs (fixed and variable)}}{\text{Total Hours of Care}}$$

$$\text{ICU/CCU Daily room charge} = \frac{\text{Other Total ICU/CCU Costs (direct and indirect)}}{\text{Actual Patient Days}}$$

The contribution margin of 7.1% used for fiscal year 1982 by St. Mark's Hospital was added to these figures so that comparisons between projected and actual revenue would be relevant.

The variable nursing charge per day was determined

by multiplying the hourly nursing charge by the number of hours in the patient classification category. By adding the ICU/CCU Daily Room charge and the Daily Variable Nursing Charge, the Total Daily Charge was calculated. In this study, the Hourly Nursing Charge was $18.45 per hour and the ICU/CCU Daily Room Charge was $151.81 rounded to $152.

The data were then tabulated, projected, reviewed and compared with actual revenue and expenses from fiscal year 1982.

CHAPTER IV

DATA ANALYSIS

In analyzing and comparing the data from the Patient Classification Report Forms and Cost Analysis Reports and applying the results to the Variable Charting System, a clearer relationship between ICU/CCU nursing costs and revenues and other ICU/CCU expenses and revenues was identified. To demonstrate how changes in patient acuity and nursing hours affect costs and revenues, two additional simulations were performed. Descriptive statistics were used to summarize, describe and project the data obtained from the ICU/CCU reporting forms.

Table 1 summarizes the distribution of patients and nursing hours by patient classification category for the entire fiscal year. A total of 75,630 hours of nursing care was delivered, representing 5,528 patient days. Class V patients represented the largest patient classification category with 2,041 patient days or 45% of the total. The smallest patient classifiction category was Class VIII, representing 1% of the total or 57 patient days. Class VI patients utilized the greatest percen-

Table 1

Frequency Distribution of Total Patients and Nursing Hours per Patient Classification Category

Classification Category	Patient Days	%	Nursing Hours	%
VIII	57.0	1	2736.0	4
VII	777.0	17	18648.0	25
VI	1653.0	37	29754.0	39
V	2041.0	45	24492.0	32
Totals	4528.0	100	75630.0	100

tage of nursing hours at 39%, followed by Class V patients at 32%.

Table 2 summarizes the quarterly distribution of patients by patient classification category. The percent range for each classification category is stable when compared with the total year's data. Class V patients consistently represented the largest patient population, between 44% and 47%, followed by Class VI, and Class VIII patients, respectively.

The total cost per patient day is displayed and compared in Table 3. The actual per diem charge during the study period was $425. The variable nursing charge developed for the study ranged from $221 per day for Class V patients, to $886 per day for Class VIII patients. With the addition of the ICU/CCU Daily Room Charge, the Total Daily Charge ranged from $373 for Class V patients, to $1038 for Class VIII patients.

Utilizing the variable charge system, patients in Class V experienced a 12% reduction in daily charges, Class VI patients, a 14% increase, Class VII patients, 40% increase, while the patients in Class VIII realized a 144% increase. Although a 46.5% average increase in daily charges existed across the four patient classification categories, 82% of the patients (Class V and Class VI) realized an average 1% increase and only

Table 2

Frequency Distribution of Patients per Patient Classification Category by Quarter

Classification Category	Quarter 1		Quarter 2		Quarter 3		Quarter 4	
	Patient Days	%	Patient Days	%	Patient Days	%	Patient Days	%
VIII	21	2	9	1	5	1	22	2
VII	209	17	210	19	176	18	182	15
VI	437	36	410	36	333	34	473	39
V	552	45	500	44	468	47	521	44
Totals	1219	100	1129	100	982	100	1198	100

Table 3

Total Variable Charges per Patient Day

Classification Category	Variable Nursing Charge	ICU/CCU Daily Room Charge	Total Daily Charge	1982 Per Diem Charge	$(Decrease)/ Increase	%(Decrease)/ Increase
VIII	$ 886	$ 152	$ 1038	$ 425	$ 613	144%
VII	443	152	595	425	170	40
VI	332	152	484	425	59	14
V	221	152	373	425	52	12

18% of the patients (Class VII and Class VIII) incurred an average 92% increase. It should be remembered here that Class V patients receive 12 hours of care per day and Class VIII patients, 48 hours of care per day.

Projected total revenue was determined by calculating the variable nursing charge revenue and ICU/CCU room charge revenue based on the collected nursing hours and patient days. Table 4 compares the net profit or loss of actual revenue and expenses, projected revenue and actual expenses, variable nursing charge revenue and other actual expenses in total and for each of the four quarters.

In reviewing actual revenue and expenses, a net profit of $41,752 is seen. This represents a profit margin of 2.10%. Losses in the second and third quarters correspond with lower patient days even though patient mix is not significantly changed. Because nursing revenues are not separated from room charge revenues in this accounting system, "loss" accountability is difficult to discern.

With the variable charging system, a net profit is also seen. The profit margin is now 6.61%, which is much closer to the institution's margin objective of 7.1%. In the second and third quarters, profit is now realized. By separately identifying nursing costs and

Table 4

Revenue and Expense Summary

	Total	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Actual Total Revenue	$1,987,003	$536,221	$492,405	$429,274	$529,103
Actual Total Expense	1,945,251	498,490	493,351	439,206	514,204
Net Profit (Loss)	41,752	37,371	(946)	(9,932)	14,899
Projected Total Revenue	2,082,826	563,557	519,232	445,646	554,391
Actual Total Expense	1,945,251	498,490	493,351	439,206	514,204
Net Profit (Loss)	137,575	65,067	25,881	6,440	40,187
Variable Nursing Charge Revenue	1,394,570	378,269	347,624	296,382	372,295
Actual Nursing Costs	1,303,402	341,971	330,183	293,364	337,884
Net Profit (Loss)	91,168	36,298	17,441	3,018	34,411
ICU/CCU Daily Room Charge Revenue	688,256	185,288	171,608	149,264	182,096
Actual Other Expenses	641,849	156,519	163,168	145,842	176,320
Net Profit (Loss)	46,407	28,769	8,440	3,442	5,776

actual other expenses, nursing care administrators and the hospital financial department can more effectively and accurately identify workload requirements and variations in patient acuity levels. Large shifts in profit or loss are avoided with the ability to more accurately predict revenues based on changes in patient acuity. Those patients in the lower patient classification categories are also not burdened with subsidizing those patients who require more nursing care. This concept is further demonstrated by the additional simulations (Tables 5 and 6).

Both Simulation I (Table 5) and Simulation II (Table 6) use actual fourth quarter patient days and actual expenses with changes made in patient acuity that are reflected in nursing hours. The original number of nursing hours in the fourth quarter was 20,514. New nursing costs were calculated by multiplying the amount of new nursing hours by the actual fixed and variable nursing costs per hour for fiscal year 1982. Actual total nursing costs per hour were $17.23; $2.83 for fixed nursing costs and $14.40 for variable nursing costs. Other expenses could not be projected so actual other expenses were used.

In Table 5, the number of patient days in Class VI and Class VII were increased to 550 and 300, respec-

Table 5

Simulation I: Frequency Distribution of Fourth Quarter Patient Days, Variable Nursing Revenue and Nursing Hours

Classification Category	Patient Days	%	Variable Nursing Revenue	Nursing Hours
VIII	22	2	19492	1056
VII	300	25	132900	7200
VI	550	46	182600	9900
V	326	27	72046	3912
Total	1198	100	407038	22068

1. Projected Nursing Hours. 22068

   X Actual Variable Nursing Costs/Hour . . X$14.40
   + Fixed Nursing Costs $53513.00

   Total Projected Nursing Costs $371292

2.

Projected Nursing Revenue	$407038		Daily Room Room Charge Revenue	$182096
		+		
- Projected Nursing Costs	- 371292	-	Actual Other Expenses	-176320
Gross Profit (Loss)	$ 35746	+	Gross Profit (Loss)	$ 5776

= Projected Net Profit (Loss) $41522.00

3. Actual Fourth Quarter Revenue. $529103

   -Projected Nursing Costs & Actual Other Expenses -547612

   Net Profit (Loss) ($18509.00)

Table 6

Simulation II: Frequency Distribution of Fourth Quarter Patient Days, Variable Projected Nursing Revenue and Projected Nursing Hours

Classification Category	Patient Days	%	Variable Nursing Revenue	Nursing Hours
VIII	0	0	0	0
VII	150	13	66450	3600
VI	448	37	148736	8064
V	600	50	132600	7200
Total	1198	100	347786	18864

1. Projected Nursing Hours. 18864

   X Actual Variable Nursing Costs/Hour . . X 14.40
   + Fixed Nursing Costs +$53513.00

   Total Projected Nursing Costs $325155.00

2.

Projected Nursing Revenue	$347786		Daily Room Room Charge Revenue	$182096
		+		
- Projected Nursing Costs	- 325155	-	Actual Other Expenses	-176320
Gross Profit (Loss)	$22631	+	Gross Profit (Loss)	$ 5776

= Projected Net Profit (Loss) $28535.00

3. Actual Fourth Quarter Revenue. $501475

   -Projected Nursing Costs & Actual Other Expenses -501347

   Net Profit (Loss) ($27628.00)

tively. This resulted in an increase of 1,554 nursing hours. Total projected nursing costs were then $371,292. Nursing revenue was increased to $407,038. Step 2 shows a projected net profit of $41,522, following the calculation of revenues less expenses. When these expenses are subtracted from the actual fourth quarter revenue (step 3), a net loss of $18,509 is realized.

In Table 6, the number of patient days in Class VIII, Class VII, and Class VI is reduced and increased in Class V. A decrease of 1,649 nursing hours was seen with total projected nursing costs of $325,155. Nursing revenue was decreased to $347,786. In this simulation, profit is seen in both Steps 2 and 3; however, there is only a $779 difference between the two charging systems, even though patient acuity was decreased.

Data analysis showed that the use of a variable nursing charge system based on patient classification had a positive effect upon total revenue for an ICU/CCU. Costs could be more easily identified, controlled and justified and there was a more stable approximation of costs to revenues, thereby enabling the nursing manager to be fiscally responsive and effective. Additionally, the variable charging system established a more

equitable means for billing patients acccording to the level of care provided.

CHAPTER V

DISCUSSION

Current patient charging methods in hospitals range from those which charge an all inclusive rate to each patient per day regardless of the amount of nursing care, type of room accomodation or number of procedures performed to those hospitals which have sophisticated itemized computer systems. Most hospitals incorporate a charging sytem that is between these two ends of the continuum. Medicare-Medicaid policies have, in the past, supported this latter system where itemized rate structures are utilized for ancillary departments such as radiology, pharmacy, respiratory therapy, physical therapy, and laboratory and a daily room charge that combines the general expenses of room, dietary, housekeeping, supplies, overhead and nursing.

An itemized rate structure for ancillary departments may be appropriate because the differences in utilization are directly affected by the type, severity and duration of a specific illness. However, as has been previously discussed, per diem charges do not reflect the cost differences in providing various

hours of nursing care to different patients and generally reflects an average of the total cost of care on all inpatient nursing units. Until recently, a 5% nursing differential was paid to hospitals providing care to Medicare patients. Even though this differential had been reported not to cover costs, section 223 of the Tax Equity and Responsibility Act of 1982 (Public Law 97-248) eliminated it. Receipt of this differential may have perpetuated the inclusion of nursing in the per diem charge by the nature of its averaging effect on reimbursement and postponed the use of patient classification (Grimaldi, 1983).

The development of a cost-based financial accounting system utilizing patient classification is a proactive approach that directly responds to the current hospital versus care cost issue. Patient classification provides hospital and nursing administration with a system, based on objective and subjective data, that identifies the care needs and nursing workload requirements of various patient populations. With the addition of a variable charging system, specific nursing department costs and revenues can be measured and evaluated, accountability defined and sufficient monies generated to maintain operational and developmental capital.

Prior to 1980, there was no formalized patient classification system at St. Mark's Hospital. The development of the previously described system in the ICU/CCU allowed nursing managers to objectively identify nursing workload requirements and develop manpower budgets based on quantifiable data. Monthly, quarterly, and yearly discrepancies, however, could not be justified because of the lack of an understandable cost-based accounting system. The all inclusive per diem room charge creates an additional dilemma, as nursing revenues are included and cannot be accurately retrieved.

One of the purposes of this study was to develop variable nursing care charges for the ICU/CCU at St. Mark's Hospital based on patient classification. The collective use of existing reporting forms, patient classification data and the application of cost accounting methods enabled the author to separate nursing costs and revenues from other ICU/CCU costs and revenues and develop separate nursing charges and room charges. The analysis of the projected and actual revenues and costs in this study show the variable charging sytsem to be profitable in each of the four fiscal quarters with identifiable cost accountability for the ICU/CCU division. In addition, the profit

margin produced with the variable charging system is much closer to the hospital's desired margin.

The two simulations further demonstrated that with changes in patient acuity and associated nursing hours, the variable charging system continued to show profit while in Simulation I, the per diem system showed a loss. Thus with the variable charging system, changes in patient acuity and occupancy rates will not produce wide swings in revenue as nursing staffing will continue to be adjusted according to the patient classification needs, thereby reducing nursing costs that will be proportionally related to nursing revenues.

Third party payers should look favorably upon a variable charging system that increases charges an average of 1% for 82% of the ICU/CCU patient population. Although the charges for Class VII and Class VIII patients are high at an average of 92%, the represented 18% of the patient population received the most concentrated amount of care. The nebulous per diem charge that was once the largest portion of the patient bill is now separated into charges for services actually received by the patient from nursing and additional room charges. This then makes retrospective review of patient charges for reimbursement a reasonable and more objective task.

Implications for Nursing

Analysis of the data demonstrates use of the variable charging system, provides a more predictable approximation of costs to revenues and makes Nursing Service an accountable, revenue-generating department. The author believes that strong consideration should be given to the following recommendations.

1. Formal presentation of the variable charging system using patient classification to St. Mark's Hospital Administration and Nursing Administration. The concepts of patient classification and revenue generation for the Department of Nursing should be stressed to obtain acceptance and approval from the hospital's main decision-making body. Additional simulations may be necessary to demonstrate a wider range of patient acuity and occupancy rate situations.

2. Pilot implementation of the variable charging system in the ICU/CCU at St. Mark's Hospital. The system should first be presented to nursing managers with emphasis placed on the accountability and revenue generation concepts. A presentation to staff nurses should be made to introduce the charging and accountability concepts, evaluate the reaction to change and stress the importance of

timely and accurate patient classification reporting, as well as the importance of their roles in the billing cycle. The pilot should be conducted in conjunction with the per diem system for additional data comparison.

3. Amend the current financial reporting forms to include revenue and separate fixed and variable direct and indirect nursing costs from "other" costs. Accountability can only be accepted when financial reporting is understandable and standardized.

4. Computerize the patient classification system for timely data calculation and data access.

5. Develop variable charging rates for the general care patient classification categories.

Suggestions for Future Research

The findings of this study cannot be generalized because the study was conducted in one hospital using a specific patient classification system and hours of nursing care. In addition, the sample is representative of only one year's patient population, which may or may not reflect a normal census in the ICU/CCU at St. Mark's Hospital.

The first suggestion for future research is to

repeat the study over a longer time period. Second, because of the high average increase in charges for Class VII and Class VIII patients, hours of care per patient classification category should be reevaluated and, where appropriate, changes made in the variable charge rates.

Another indication for future research is in the area of governmental reimbursement restrictions. New Medicare-Medicaid reimbursement regulations and upcoming Diagnosis Related Grouping regulations may create deductions from revenue that are, as of yet, unknown.

Diagnosis Related Groupings (DRGs) are used as the method accepted by the United States government to determine case mix adjustment. Developed at Yale University in Connecticut as a management and utilization review tool, and tested in New Jersey hospitals, DRGs are based on the concept that patients with similar medical needs can be classified into clinical groups that require similar resource consumption. To assign a patient to a DRG, four variables are most commonly used: surgical procedure, principal diagnosis, patient age, and the presence of a qualifying complication or comorbid condition. There are approximately 356 DRGs derived from 23 major diagnostic categories. As a type of prospective reimbursement, hospitals are paid a flat, illness-specific,

amount that has been determined before care is received. Average cost per DRG is based on retrospective cost data from the hospital and its geographic region, which is then adjusted for inflation (based on market index) plus 1%. Hospital revenues can be determined by multiplying the number of patients in each DRG discharged from the hospital by average cost for that DRG (Curtain, 1983).

Costs of nursing services are presently included in the average or target costs within a DRG. Because of the differences in nurse staffing mix, patient classification systems and nursing care delivery, there is concern and evidence that hospital departments of nursing will need to justify costs based on acuity which must be related to a patient's DRG. Therefore, variable charging for nursing services based on patient classification should be studied in relation to the average amount of time required to deliver nursing care per DRG and costs and revenues compared.

Summary

This researcher has presented an exploratory, descriptive study on the use of patient classification as a means for variable patient billing in an ICU/CCU.

In today's cost-conscious health environment, all hospital departments must demonstrate fiscal responsibility. Patient classification systems have provided nur-

sing service administrators with the information necessary to efficiently and effectively manage manpower resources and deliver optimal patient care. Fiscal responsiveness, however, requires nursing service to be an accountable, revenue-generating department with charges that reflect the amount of care the patient actually received. This study has shown that variable billing based on patient classification can make nursing service a financial asset. Validating nursing as an income producer, therefore, enhances professional influence and credibility in making nursing management and practice decisions.

APPENDIX A

COMMON DIAGNOSES OF PATIENTS ADMITTED TO ST. MARK'S HOSPITAL ICU/CCU

Diagnoses
Acute myocardial infarction
Unstable angina
Disorders of cardiac rhythm
Postcardiopulmonary arrest
Cardiomyopathy
Pericarditis
Endocarditis
Congestive heart failure
Cardiogenic shock
Septic shock
Acute respiratory failure
Adult respiratory distress syndrome
Chronic obstructive lung disease
Acute renal failure
Multiple trauma
Postsurgical procedures requiring ventilatory support and/or invasive monitoring
Craniotomy for tumor
Cerebral aneurysm rupture
Epidural, subdural, intracranial hematomas
Cerebrovascular accident
Poisoning/overdose
Diabetic ketoacidosis
Coronary artery bypass surgery
Cardiac valvular surgery
Ventricular aneurectomy
Carotid Endartorectomy
Abdominal aneurysm resection
Peripheral cardiovascular surgery
Postpercutaneous transluminal coronary angioplasty

APPENDIX B

CRITICAL INDICATORS: PATIENT CLASSIFICATION

ST. MARK'S HOSPITAL
NURSING SERVICE

ICU/CCU Patient Classification

INSTRUCTIONS:

1. Check all boxes beside all criteria that apply to the patient.
2. Add all check marks vertically. The patient classification is determined by the classificaton column with the most checks. A tie automatically moves the patient up one classification.
3. If there are five or more indicators checked in Class VI the patient automatically becomes a class VII.
4. If the patient is in isolation, the classification should be increased by one level.

DESCRIPTIONS:

VS/NS/Rx q 2 VS/NS/Rx q 1 VS/NS/Rx q 15-30 min.	Any vital signs, neuro checks or nursing interventions that are done consistently throughout the shift by the indicated time frames. This may include: NG lavages, tube feedings, suctioning, I&O's, fluid replacements, dressing changes, etc.
Vasoactive Drugs	The use of vasodilator or vasopressor agents including: Nipride, Dopamine, Levophed, Epinephrine, Neosynephrine, Aramine and Dobutamine.
IV and IVPB 2 or 3 IV and IVPB 4 or more	If the patient has IV's and/or IVPB (ie) I peripheral IV and 2 IVPB meds, I subclavian and 1 peripheral IV, 2 peripheral IV's and 2 IV drips, 3 peripheral IV and IVPB, etc.
Invasive 1 or 2 Invasive 3 or more	Invasive lines include: CVP, arterial line, Swan-Ganz catheter, right atrial, left atrial, intraventricular catheter, subarchnoid screw.
IABP-LV Assist	Any patient requiring the intraaortic balloon pump and/or left ventricular assist device.
Arrhythmias-life threat/ controlled	PVC's 5/min., in runs, multifocal, R on T, supraventricular tachy or Sinus brady with clinical changes, 1',2',3' AV block that are being treated and controlled with drips or IV push drugs (lidocaine, Atropine, IV Inderal or Digoxin, etc.)
Arrhythmias-life threat/ not controlled	Arrhythmias noted above that require frequent regulation of drips or IV push drugs or defibrillation.
Ventilator	Any patient on a MAI or Bear respirator.
Emotional/teaching support 45 min/shift	Patient/Family emotional support and/or teaching that requires more than 45 min/shift.
Isolation	Isolation requiring gowning, gloving, etc. not secretion precautions.

APPENDIX C

PATIENT CLASSIFICATION WORKSHEET

DATE_____

UNIT_____

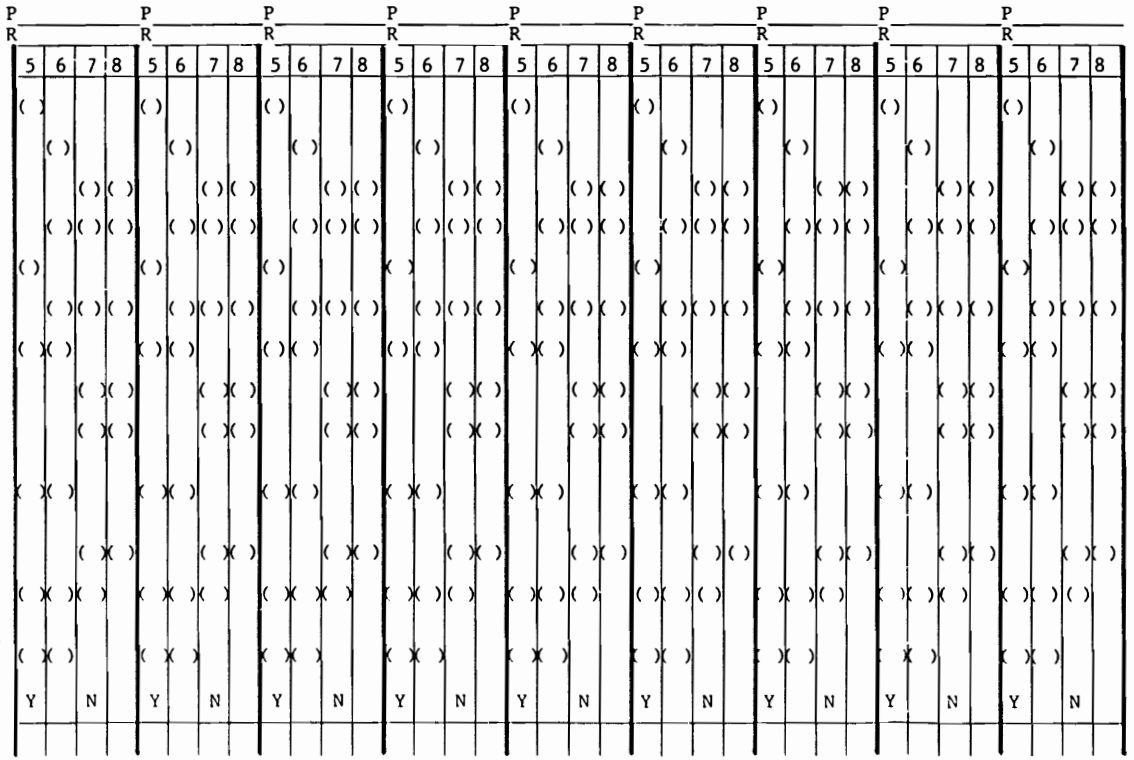
SHIFT_____

CRITICAL CARE CENTER

PATIENT CLASSIFICATION

To be completed at 1300, 1900, and 0300

P = Patient Name
R = Patient Room



TOTALS:

5 _____

6 _____

7 _____

8 _____

Y = YES N = NO

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